

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is requested. Claims 1-2, 5-7, 9-10, 13-17, 19-25, and 27-30 are now in this application. Claims 3, 4, 8, 11-12, 18, and 26 have been cancelled. Claims 29 and 30 have been added to alternately and additionally claim the present invention. Claims 9 and 17 have been allowed.

The Examiner objected to the amendment mailed on March 15, 2002 under 35 U.S.C. §132 as introducing new matter into the disclosure. In objecting to the amendment, the Examiner indicated that there is support for the formation of a layer of third material over a planarized layer of material, but argued that there is no support for a layer of material 342 that lowers resistance.

The Examiner objected to the amendment mailed on March 4, 2003 under 35 U.S.C. §132 as introducing new matter into the disclosure. In objecting to the amendment, the Examiner argued that there is no support in the specification for the limitations in claim 22 that require that the third layer of material lower the resistance of the first material. In addition, the Examiner argued that there is no support in the specification for the limitations in claim 25 that require that the layer of third material be selectively etched during the selective etching process.

The Examiner rejected claims 19-23 and 25 under 35 U.S.C. §112, first paragraph. In rejecting the claims, the Examiner argued that there is no support in the specification for the limitations in claim 22 that require that the third layer of material lower the resistance of the layer of first material. In addition, the Examiner argued that there is no support in the specification for the limitations in claim 25 that require that the layer of third material be selectively etched during the selective etching process.

In the last amendment, with respect to each of the above rejections which are based on the argument that the specification does not teach a third layer of material that lowers the resistance of the layer of first material, applicant noted that applicant's specification teaches:

“After this, as shown in FIG. 3B, oxide layer 330 and polysilicon layer 320 are chemically-mechanically polished until oxide layer 330 is substantially, completely

removed from the surface of polysilicon layer 320 to form a planarized layer of polysilicon 340.” (See page 5, lines 13-16.)

Thus, applicant’s specification teaches that polysilicon layer 320, which can be read to be a layer of first material, and oxide layer 330, which can be read to be a layer of second material, are chemically-mechanically polished to form a planarized layer of polysilicon 340, which can be read to be the planarized layer of material.

In addition, applicant’s specification also recites,

“Once planarized polysilicon layer 340 has been formed, a mask (not shown) is formed and patterned on planarized polysilicon layer 340.

Next, planarized polysilicon layer 340 is etched to form a number of structures, such as local interconnect lines, that are electrically connected to individual devices on wafer 300. (The locations where the structures make electrical contacts with the individual devices of wafer 300 are prepared before polysilicon layer 320 is deposited, and are assumed to be a part of wafer 300.)

Alternately, after the planarization step, one or more additional layers of material, such as materials which lower the resistance of polysilicon, can be formed over layer 340. The mask is then formed and patterned on the additional layers of material which are then etched along with planarized polysilicon layer 340 to form the structures (e.g., local interconnect lines).” [Underlining added.] (See page 5, line 16, to page 6, line 1.)

Thus, if one additional layer of material is used, the one additional layer of material can be read to be a third layer of material, and can be described as a layer of material 342. The Examiner appears to agree with this, stating that there is support for the formation of a layer of third material over a planarized layer of material.

The above section of applicant’s specification also indicates that the one additional layer of material can lower the resistance of polysilicon. In responding to applicant’s comments, the Examiner stressed that the specification as originally filed does not support the formation of a layer of material over the polysilicon layer that reduces the resistance of the polysilicon layer.

Applicant respectfully does not understand the argument set forth by the Examiner as the originally-filed specification expressly states that one additional layer of material, “such as materials which lower the resistance of polysilicon,” can be formed over polysilicon layer

340. Applicant acknowledges that the originally-filed specification does not refer to a layer 342, but this does not prevent the specification from being amended to include a layer 342 when, as in the present case, the specification describes the layer.

Thus, without further direction from the Examiner, applicant does not understand the Examiner's basis for asserting that the originally-filed specification does not support the formation of an additional layer of material, such as a material that lowers the resistance of polysilicon, over planarized polysilicon layer 340, when the originally-filed specification appears to provide all of the necessary support.

Thus, since the originally-filed specification provides the necessary support, the amendment mailed on March 15, 2002 and the amendment mailed on March 4, 2003 do not introduce new matter into the disclosure with respect to the third layer of material lowering the resistance of the layer of first material. For the same reasons, claims 19-23 and 25 satisfy the requirements of the first paragraph of 35 U.S.C. §112 with respect to the third layer of material lowering the resistance of the layer of first material.

With respect to each of the above rejections which are based on the argument that the specification does not teach that the layer of third material is selectively etched during the selective etching process, applicant again respectfully does not understand the arguments set forth by the Examiner. Whenever a mask is formed and patterned, and the exposed regions are then etched, selective etching takes place. Thus, the as-filed specification, as illustrated above, supports selective etching.

As further illustrated above, the as-filed specification teaches, from page 5, line 27 to page 6, line 1, that the

“mask is then formed and patterned on the additional layers of material which are then etched along with planarized polysilicon layer 340 to form the structures (e.g., local interconnect lines).”

Applicant respectfully does not understand the argument set forth by the Examiner as the originally-filed specification expressly states that one additional layer of material, which can be read to be a layer of third material, is selectively etched (by virtue of the mask) along

with the planarized layer of material, which can be read to be the selective etching process (the etching of the additional layer of material along with polysilicon layer 340).

As a result, without further direction from the Examiner, applicant does not understand the Examiner's basis for asserting that the originally-filed specification does not support a layer of third material that is selectively etched during the selective etching process, when the originally-filed specification appears to provide all of the necessary support.

Thus, since the originally-filed specification provides the necessary support, the amendment mailed on March 4, 2003 does not introduce new matter into the disclosure with respect to the layer of third material and the layer of first material being selectively etched. For the same reasons, claims 19-23 and 25 satisfy the requirements of the first paragraph of 35 U.S.C. §112 with respect to the layer of third material and the layer of first material being selectively etched.

The Examiner rejected claims 1, 2, 5-7, 10, 13-16, 19-25, and 27-28 under 35 U.S.C. §102(e) as being anticipated by Li et al. (U.S. Patent No. 6,162,368). For the reasons set forth below, applicant respectfully traverses this rejection.

Claim 1 recites, in part,

“forming a layer of first material . . . ;
“forming a layer of second material on the top surface of the layer of first material; and
“chemically-mechanically polishing the layer of second material and the underlying layer of first material with a slurry until the layer of second material is substantially all removed from the layer of first material to form the planarized layer of material, the planarized layer of material lying over the wafer upper levels and the wafer lower level.”

In rejecting the claims, the Examiner pointed to the step of forming the layer of polysilicon 16 as constituting the step of forming a layer of first material, and the step of forming native oxide layer 18 as constituting the step of forming a layer of second material. The Examiner also argued that the Li reference teaches the chemical-mechanical polishing step required by the claims.

The chemical-mechanical polishing step of claim 1 includes two requirements: (1) the polishing continues “until” the layer of second material is substantially all removed from the

layer of first material, and (2) the polishing forms a planarized layer of material. Applicant respectfully suggests that the Examiner has not given the proper meaning to the word “until” in the present rejection.

A definition of the word “until” is “up to the time of” (we danced until dawn), or “up to the time that” (we walked until it got dark). (See attached definitions from dictionary.com.) Thus, the word “until” defines a point at which an activity stops. The phrase “we danced until dawn” means that the dancers stopped dancing at dawn. Similarly, the phrase “we walked until it got dark” means that the walkers stopped walking when it got dark.

As a result, the phrase “chemically-mechanically polishing the layer of second material and the underlying layer of first material with a slurry until the layer of second material is substantially all removed from the layer of first material” means that the polishing stops when the layer of second material is substantially all removed from the layer of first material.

In the last amendment, applicant noted that the Li reference teaches two chemical-mechanical polishing steps: a first step that uses slurry 50a to remove native oxide layer 18, and a second step that uses slurry 50b to remove polysilicon layer 16. As shown in FIG. 2C, Li teaches that the first chemical-mechanical polishing step, which uses slurry 50a, stops when all of the native oxide layer 18 (read to be the layer of second material) has been removed from polysilicon layer 16 (read to be the layer of first material).

However, the first polishing step of Li can not be read to be the chemical-mechanical polishing step of claim 1 because the first chemical-mechanical polishing step of Li (slurry 50a) does not “form the planarized layer of material” as required by claim 1. As further shown in FIG. 2C of Li, when all of the native oxide layer 18 (read to be the layer of second material) has been removed from polysilicon layer 16 (read to be the layer of first material) with slurry 50a, the remaining layer of polysilicon 16 still has a severe non-planar topology.

Thus, the first chemical-mechanical polishing step of Li (slurry 50a) does not form a planarized layer of material. Instead, the first chemical-mechanical polishing step of Li exposes the severe topology of polysilicon layer 16. As a result, the first chemical-

mechanical polishing step of Li (slurry 50a) can not be read to be the chemical-mechanical polishing step of claim 1.

In addition, the first and second chemical-mechanical polishing steps can not be read together as a single step because, as a single step, the polishing does not stop until polysilicon layer 16 is planarized as shown in FIG. 2D of Li. Thus, when both polishing steps are read to be a single step, once substantially all of the oxide layer 18 has been removed, the polishing does not stop as required by claim 1, but continues on until polysilicon layer 16 is planarized.

In an attempt to add further clarification, applicant has added new claim 29 which recites, in part,

“forming a planarized layer of material by chemically-mechanically polishing the layer of second material and the underlying layer of first material with a slurry until the layer of second material is substantially all removed from the layer of first material, the planarized layer of material lying over the wafer upper levels and the wafer lower level.”

Thus, new claim 29 requires that the polishing stop when the layer of second material is substantially all removed from the layer of first material. In Li, the polishing stops when all of the native oxide layer 18 (read to be the layer of second material) has been removed from polysilicon layer 16 (read to be the layer of first material) with slurry 50a. However, as noted above, the remaining layer of polysilicon 16 (read to be the layer of first material) still has a severe non-planar topology which can not be read to be a planarized layer of material.

In responding to applicant's arguments, the Examiner argued that it is irrelevant whether one slurry is used or multiple slurries are used. Applicant notes, however, that the relevance is that when one slurry (50a) is used, the Li reference does not read on the claims. Similarly, when multiple slurries (50a and 50b) are read to be a single etching step, the Li reference still does not read on the claims.

Therefore, since the Li reference does not teach or suggest the chemical-mechanical polishing steps required by claim 1 and new claim 29, claim 1 and new claim 29 are not anticipated by Li. In addition, since claims 2, 5-7, 10, and 13-16 depend either directly or indirectly from claim 1, these claims are not anticipated by Li for the same reasons as claim 1.

With respect to claim 22, this claim recites, in part,

“forming a layer of third material on the planarized layer of first material, the third layer of material lowering a resistance of the first layer of material.”

In rejecting claim 22, the Examiner pointed to the step of forming layer 106 or 114 as constituting the step of forming a layer of third material. However, the structures shown in FIGs. 2E and 2F that are identified by reference numerals 106 and 114 are not a layer of material, but are instead the outer layer of outer polishing pad 100, and a soft layer of polishing pad 110. (See column 3, lines 12-15 and lines 28-29 of Li.) Thus, since Li fails to teach or suggest the formation of a layer of third material, claim 22 is not anticipated by the Li reference. In addition, since claims 19-21 and 23 depend from claim 22, claims 19-21 and 23 are not anticipated by Li for the same reasons as claim 22.

With respect to claim 24, this claim recites, in part,

“selectively etching the planarized layer of material that covers the wafer upper levels and the wafer lower level of the top surface of the wafer.”

In rejecting claim 24, the Examiner asserted that the Li reference teaches “selectively etching the planarized layer of material that covers (see Figs. 2A-2I and Col. 4, line 37 through Col. 6, line 54).” Applicant respectfully has been unable to identify the steps in Li that the Examiner believes reads on the selectively etching step, and has been otherwise been unable to find any discussion in Li that teaches or suggests that polysilicon layer 16 (the layer of first material) is selectively etched when polysilicon layer 16 covers the upper levels of regions 14 as required by claim 24.

In responding to applicant’s inability to identify the steps in Li that the Examiner believes reads on the selectively etching step, the Examiner pointed to FIGs. 2E and 2F of Li as teaching a selective etching step. However, from what applicant can determine, the only difference between FIGs. 2E and 2F of Li is that the pads, which do not provide selective etching, have been changed. As a result, claim 24 is not anticipated by Li. In addition, since claims 25 and 27-28 depend either directly or indirectly from claim 24, claims 25 and 27-28 are not anticipated by Li for the same reasons as claim 24.

With respect to new claim 30, this claim recites, in part,

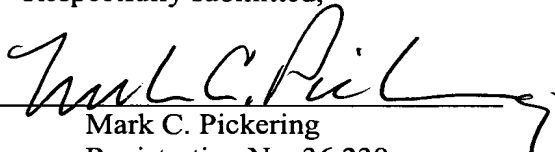
“forming a layer of third material on the planarized layer of first material, the third layer of material not contacting the wafer lower level and the wafer upper level.”

Thus, claim 30 requires the formation of a third layer of material, but does not require that the third layer of material lower the resistance of the first layer of material. In addition, new claim 30 is patentable over the Li reference because, as shown in FIG. 2G of Li, if a layer of third material was formed on polysilicon layer 16 (read to be the layer of first material), then the third layer of material must necessarily contact the wafer upper surface (presumably read to be the top surface of oxide region 14).

Thus, for the foregoing reasons, it is submitted that all of the claims are in a condition for allowance. Therefore, the Examiner's early re-examination and reconsideration are respectively requested.

Respectfully submitted,

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By: 
Mark C. Pickering
Registration No. 36,239
Attorney for Assignee

P.O. Box 300
Petaluma, CA 94953-0300
Direct Dial Telephone No. (707) 762-5583
Telephone: (707) 762-5500
Facsimile: (707) 762-5504
Customer No. 33402



until

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un·til   **Pronunciation Key** (ũn-tĭl')
prep.

1. Up to the time of: *We danced until dawn.*
2. Before (a specified time): *She can't leave until Friday.*
3. *Scots.* Unto; to.

conj.

1. Up to the time that: *We walked until it got dark.*
2. Before: *You cannot leave until your work is finished.*
3. To the point or extent that: *I talked until I was hoarse.* See Usage Note at [till](#)².

[Middle English : un-, *up to* (from Old Norse *und*. See *ant-* in Indo-European Roots) + *tīl*, *till*; see [till](#)².]

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*\Un*til"\, conj. As far as; to the place or degree that; especially, up to the time that; till. See Till, conj.

In open prospect nothing bounds our eye, Until the earth seems joined unto the sky. --Dryden.

But the rest of the dead lives not again until the thousand years were finished. --Rev. xx. 5.

Source: Webster's Revised Unabridged Dictionary, © 1996, 1998 MICRA, Inc.

until

\Un*til"\, prep. [OE. until, ontill; un- (as in unto) + til till; cf. Dan. indtil, Sw. intill. See Unto, and Till, prep.]

1. To; unto; towards; -- used of material objects. -- Chaucer.

Taverners until them told the same. --Piers Plowman.

He roused himself full blithe, and hastened them until. -- Spenser.

2. To; up to; till; before; -- used of time; as, he staid until evening; he will not come back until the end of the month.

He and his sons were priests to the tribe of Dan until the day of the captivity. --Judg. xviii. 30.

Note: In contracts and like documents until is construed as exclusive of the date mentioned unless it was the manifest intent of the parties to include it.

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